controlling a sputtering gas pressure in a sputtering chamber in forming the reflecting layer by the sputtering method, wherein the sputtering gas pressure in the sputtering chamber is set within a range from a 0.23 to 0.53 Pa..

REMARKS

Claims 1-6 are pending in the application. By this Amendment, claims 1, 5 and 6 are amended.

Applicant expresses his appreciation for the Examiner's indication of allowable subject matter in claim 6. Claim 6 is amended to obviate the objection. Furthermore, claim 6 is amended to decrease the sputtering gas pressure range.

A. *Rejection of Claims 1-5*

Claims 1-5 are rejected under 35 U.S.C. 103(a) as unpatentable over Usami et al. (U.S. Patent No. 6,341,122) in view of Matsumaru et al. (EP 0508478) or Hijakata et al. (U.S. Patent No. 5,630,886). The rejection is respectfully traversed.

Usami teaches an optical information recording medium that includes a transparent disk substrate, a recording dye layer and a light-reflecting layer arranged in this order. The transparent disk substrate is provided with a spiral pregroove. The recording dye layer is placed in the pregroove on which information is recorded by irradiation with a laser beam. The pregroove is formed in an area between an inner circle having a radius corresponding to a half of a radius of the disk substrate and an outer circle having a radius corresponding to 19/20 of the radius of the disk substrate.

Matsumaru teaches a process for forming metal film and aluminum film-coated matter. In a metal film with high reflectivity and excellent adhesion to a synthetic resin substrate is formed on a surface of the substrate by sputtering a metal target through an inert gas ion beam drawn out of an ion source in a vacuum vessel. The aluminum film-coated matter contains aluminum crystals. The aluminum crystals have a relation in which a crystal axis (111) perpendicular to a (111) plane is perpendicular or substantially perpendicular to the film surface. The aluminum crystals exhibit a

diffraction x-ray spectrum of a (111) plane when measured by x-ray diffraction.

Hijikata teaches a corrosion-resistant film for protecting surfaces of silver and corrosion-resistant, composite structures. The corrosion-resistant film protects the surfaces of silver and includes a silver magnesium alloy.

Claim 1 is directed to an optical recording medium that includes at least a recording layer comprising an organic dye, a reflecting layer composed of a metal and a protective layer laminated in this order on a light-transmittable substrate. Claim 1 recites that the reflecting layer is a thin film comprising silver as the major component and satisfies a relative intensity ratio of I (200)/I (111) being 0.49 or more when an X-ray diffraction intensity by a (111) plane is designated as I (111) and an X-ray diffraction intensity by a (200) plane is designated as I (200) in an X-ray diffraction spectrum measured by a θ-2θ method while an angle of incidence with reference to a surface of the light-transmissible substrate is set at θ.

Claim 5 is directed to a method for producing an optical recording medium which includes at least a recording layer comprising an organic dye, a reflecting layer composed of a metal by a sputtering method and a protective layer laminated in this order on a light-transmissible substrate. The method includes the step of forming a thin film comprising silver as the major component and satisfies a relative intensity ratio of I (200)/I (111) being 0.49 or more when an X-ray diffraction intensity by a (111) plane is designated as I (111) and an X-ray diffraction intensity by a (200) plane is designated as I (200) in an x-ray diffraction spectrum measured by a θ-2θ method while an angle of incidence with reference to a surface of the light-transmissible substrate is set at θ, by controlling a sputtering gas pressure in a sputtering chamber in forming the reflecting layer by the sputtering method.

It is respectfully submitted that none of the applied art, alone or in combination, teaches or suggests the features of claims 1 and 5. Specifically, none of the applied art, alone or in combination, teaches or suggests a thin film comprising silver as the major component that satisfies a relative intensity ratio of I (200)/I (111) being 0.49 or more when an X-ray diffraction intensity by a (111) plane is designated as I (111) and an X-ray diffraction intensity by a (200) plane is designated as I (200) in an x-ray

diffraction spectrum measured by a θ-2θ method while an angle of incidence with reference to a surface of the light-transmissible substrate is set at θ as recited in claims 1 and 5. Thus, it is respectfully submitted that one of ordinary skill in the art would not be motivated to combine the features of the applied art because such combination would not result in the claimed invention. Thus, claims 1 and 5 are allowable over the applied art.

Claims 2-4 depend from claim 1 and include all of the features of claim 1. Thus, the dependent claims are allowable at least for the reasons claim 1 is allowable as well as for the features they recite.

Withdrawal of the rejection is respectfully requested.

B. ***Rejection of Claims 1 and 5***

Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as unpatentable over Kamiyama (EP 0987700 A1). The rejection is respectfully traversed.

Kamiyama teaches a device and method for manufacturing an optical recording medium having a plurality of recording layers formed on a substrate. The manufacturing device includes a vacuum pretreatment chamber, a plurality of recording layer forming chambers for forming each recording layer by vapor-depositing an organic pigment material, a reflective layer forming chamber and a vacuum post-treatment chamber. Each of the recording layer forming chambers has at least one recording layer forming unit and the reflective layer forming chamber has at least one reflective layer forming unit.

It is respectfully submitted that none of the applied art, alone or in combination, teaches or suggests the features of claims 1 and 5. Specifically, none of the applied art, alone or in combination, teaches or suggests a thin film comprising silver as the major component that satisfies a relative intensity ratio of I (200)/I (111) being 0.49 or more when an X-ray diffraction intensity by a (111) plane is designated as I (111) and an X-ray diffraction intensity by a (200) plane is designated as I (200) in an x-ray diffraction spectrum measured by a θ-2θ method while an angle of incidence with reference to a surface of the light-transmissible substrate is set at θ as recited in claims

1 and 5. Thus, it is respectfully submitted that one of ordinary skill in the art would not be motivated to combine the features of the applied art because such combination would not result in the claimed invention. Thus, claims 1 and 5 are allowable over the applied art.

Withdrawal of the rejection is respectfully requested.

C. Consideration of IDS, Japanese Office Action and Japan 10-11799A

Applicant respectfully requests that the Examiner further consider the Information Disclosure Statement, the Japanese Office Action (a/k/a Notification of Reason for Refusal issued for Japanese application 2001-81950) and Japan 10-11799, (Japan 799), all of which were filed with United States Patent and Trademark Office on January 23, 2003.

C.1. Patentability of the amended claims 1 to 4 over Japan 799

In the present invention, there is correlation between the relative intensity ratio I(200)/I(111) and the sputtering gas pressure, as described in the specification that "When the argon gas pressure is within a range of about 0.23 to 8.17 Pa, . . ., the relative intensity ratio I(200)/I(111) between the (200) surface and the (111) surface of the face-centered cubic lettice of silver in the thin film crystal decreases according as the argon gas pressure increases. Conversely, the relative intensity ratio I(200)/I(111) increase according as the argon gas pressure decreases (page 16, lines 4 to 13)".

Specifically, "when the sputtering is carried out under an argon gas pressure of 0.23 Pa which is near to the critical pressure at which the electric discharge occurs, the relative intensity ratio I(200)/I(111) of the silver thin film is around 0.55 to 0.60 (page 16, line 22 to page 17, line 1)"; "According as the argon gas pressure in increased, the relative intensity ratio I(200)/I(111) decreases. When the sputtering is carried out under an argon gas pressure of 0.73 Pa, a silver thin film having a relative intensity ratio I(200)/I(111) around 0.47 is provided (page 17, lines 10 to 14)"; "When the sputtering is carried out

under an argon gas pressure of 1.00 Pa, a silver thin film having a relative intensity ratio I(200)/I(111) around 0.41 is provided (page 17, lines 17 to 19)".

This correlation is reflected more specifically in Table 1 of the present Examples.

As the Example 6 in Table 1 shows, 0.53 Pa of a sputtering gas pressure gives a silver thin film having a relative intensity ratio I(200)/I(111) = 0.49, which is lower limit of the range of a relative intensity ratio recited in the amended claim 1. Therefore, with considering above-mentioned correlation, the sputtering gas pressure of 0.53 Pa or less gives a silver thin film having a relative intensity ratio I(200)/I(111) being 0.49 or more, which is the range of a relative intensity ratio recited in the amended claim 1.

On the other hand, Japan 799 discloses the optical recording medium produced by approximately 0.67 Pa of a sputtering gas pressure. Namely, in Japan 799, the optical recording medium having the silver thin film with a specified range of a relative intensity ratio of the amended claim 1 is never described.

Additionally, the present specification describes that "according as the sputtering gas pressure decreases," i.e., according as the relative intensity ratio increases, "the sputtering layer has a denser film constitution (page 15, line 24 to page 16, line 1)"; and that "there is a close relationship between the relative intensity ratio I(200)/I(111), i.e. the fine structure of the silver film, and the high-temperature high-humidity resistance characteristics of the optical recording medium (page 18, line 4 to 7)"; and that "according as the relative intensity ratio I(200)/I(111) decreases, the PI errors in particular among the characteristics of the optical recording medium tend to increase after the preservation under the high-temperature high-humidity environment as compared with the characteristics at the initial time (page 18, line 20 to 25)". From the description cited above, there is a remarkable effect that specifying the relative intensity ratio to 0.49 or more brings the optical recording medium with more excellent characteristics of high-temperature high-humidity resistance.

Therefore, the amended claim 1 would be patentable over Japan 799. Incidentally, the claims 2 to 4 would also be patentable due to their dependency from the amended claim 1.

C.2. *Patentability of the amended claim 5 over Japan 799*

The present specification describes that "When the argon gas pressure is within a range of about 0.23 to 8.17 Pa, . . . , the relative intensity ratio I(200)/I(111) between the (200) surface and the (111) surface of the face-centered cubic lattice of silver in the thin film crystal decreases according as the argon gas pressure increases. Conversely, the relative intensity ratio I(200)/I(111) increases according as the argon gas pressure decreases (page 16, lines 4 to 13)". In the present invention, the above-mentioned correlation between the relative intensity ratio I(200)/I(111) and the sputtering gas pressure is found to control the sputtering gas pressure.

Specifically, "when the sputtering is carried out under an argon gas pressure of 0.23 Pa which is near to the critical pressure at which the electric discharge occurs, the relative intensity ratio I(200)/I(111) of the silver thin film is around 0.55 to 0.60 (page 16, line 22 to page 17, line 1)"; "According as the argon gas pressure is increased, the relative intensity ratio I(200)/I(111) decreases. When the sputtering is carried out under an argon gas pressure of 0.73 Pa, a silver thin film having a relative intensity ration I(200)/I(111) around 0.47 is provided (page 17, lines 10 to 14)"; "When the sputtering is carried out under an argon gas pressure of 1.00 Pa, a silver thin film having a relative intensity ratio I(200)/I(111) around 0.41 is provided (page 17, lines 17 to 19)".

This correlation is reflected more specifically in Table 1 of the present Examples.

As the Example 6 in Table 1 shows, controlling a sputtering gas pressure to 0.53 Pa gives a silver thin film having a relative intensity ratio I(200)/I(111) = 0.49, which is the lower limit of the range of a relative intensity ratio recited in the amended claim 5. Therefore, with considering above-mentioned correlation,

controlling a sputtering gas pressure to 0.53 Pa or less gives a silver thin film having a relative intensity ration I(200)/I(111) being 0.49 or more, which is the range of the relative intensity ratio recited in the amended claim 5.

On the other hand, in Japan 799, approximately 0.67 Pa of a sputtering gas pressure is disclosed. Namely, Japan 799 never discloses that the sputtering gas pressure is controlled in order to produce the optical recording medium having the silver thin film with a specified range of a relative intensity ratio of the amended claim 5.

Additionally, the present specification describes that "according as the sputtering gas pressure decreases," i.e. according as the relative intensity ratio increases, "the sputtering layer has a denser film constitution (page 15, line 24 to page 16, line 1)"; and that "there is a close relationship between the relative intensity ratio I(200)/I(111), i.e. the fine structure of the silver film, and the high-temperature high-humidity resistance characteristics of the optical recording medium (page 18, line 4 to 7)"; and that "according as the relative intensity ratio I(200)/I(111) decreases, the PI errors in particular among the characteristics of the optical recording medium tend to increase after the preservations under the high-temperature high-humidity environment as compared with the characteristics at the initial time (page 18, line 20 to 25)". From the description cited above, there is a remarkable effect that specifying one relative intensity ratio to 0.49 or more brings the optical recording medium with more excellent characteristics of high-temperature high-humidity resistance.

Therefore, the amended claim 5 would be patentable over Japan 799.

C.3. *Patentability of the amended claim 6 over Japan 799*

The amended independent claim 6 includes all features of the amended claim 5. From the remarks mentioned in the paragraph arguing about *Patentability of the Amended Claim 5* over Japan 799 and incidentally from the fact that Japan 799 never describes the specified range of a sputtering gas pressure of 0.23 to 0.53 Pa, the amended claim 6 would be patentable over

Japan 799.

In view of the foregoing, reconsideration of the application and allowance of the pending claims are respectfully requested. Should the Examiner believe anything further is desirable in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' representative at the telephone number listed below.

Should additional fees be necessary in connection with the filing of this paper or if a Petition for Extension of Time is required for timely acceptance of the same, the Commissioner is hereby authorized to charge Deposit Account No. 18-0013 for any such fees and Applicant(s) hereby petition for such extension of time.

Respectfully submitted,

Date: March 17, 2003

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Enclosure(s): Appendix I (Marked-Up Version of Amended Claims)

DC115235

APPENDIX I

(MARKED-UP VERSION OF AMENDED CLAIMS)

1. (Twice Amended) An optical recording medium which comprises at least a recording layer comprising an organic dye, a reflecting layer composed of a metal, and a protective layer laminated in this order on a light-transmittable substrate, wherein the reflecting layer is a thin film comprising silver as the major component and satisfying a relative intensity ratio of I(200)/I(111)~~>0.47~~ being 0.49 or more when an X-ray diffraction intensity by a (111) plane is designated as I(111) and an X-ray diffraction intensity by a (200) plane is designated as I(200) in an X-ray diffraction spectrum measured by a θ-2θ method while an angle of incidence with reference to a surface of the light-transmittable substrate is set at θ.

5. (Twice Amended) A method for producing an optical recording medium which comprises at least a recording layer comprising an organic dye, a reflecting layer composed of a metal by a sputtering method, and a protective layer laminated in this order on a light-transmittable substrate, said method comprising the step of forming a thin film comprising silver as the major component and satisfying a relative intensity ratio of I(200)/I(111)~~>0.47~~ being 0.49 or more when an X-ray diffraction intensity by a (111) plane is designated as I(111) and an X-ray diffraction intensity by a (200) plane is designated as I(200) in an X-ray diffraction spectrum measured by a θ-2θ method while an angle of incidence with reference to a surface of the light-transmittable substrate is set at θ, by controlling a sputtering gas pressure in a sputtering chamber in forming the reflecting layer by the sputtering method.

6. (Twice Amended) ~~The~~ A method for producing an optical recording medium ~~according to claim 5~~which comprises at least a recording layer comprising an organic dye, a reflecting layer composed of a metal by a sputtering method, and a protective layer laminated in this order on a light-transmittable substrate, said method

comprising the step of forming a thin film comprising silver as the major component and satisfying a relative intensity ratio of I(200)/I(111) >0.47 when an X-ray diffraction intensity by a (111) plane is designated as I(111) and an X-ray diffraction intensity by a (200) plane is designated as I(200) in an X-ray diffraction spectrum measured by a θ-2θ method while an angle of incidence with reference to a surface of the light-transmittable substrate is set at θ, by controlling a sputtering gas pressure in a sputtering chamber in forming the reflecting layer by the sputtering method, wherein the sputtering gas pressure in the sputtering chamber is set within a range from a 0.23 to ~~0.73~~ 0.53 Pa..